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LOWER GASTROINTESTINAL BLEEDING IN PATIENTS ADMITTED TO A UNIVERSITY HOSPITAL

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Abstract: Objective: To understand the epidemiological profile of cases of lower gastrointestinal bleeding (LGE) with evidence of visible bleeding in the form of hematochezia, bloody diarrhea or melena in patients admitted to HUUFPI. **Methods:** Analytical cross-sectional study of 44 cases of CDH (2016-2017). SADT reports and electronic medical records of patients with HDB were analyzed. Associations and odds ratios between sociodemographic variables, colonoscopy findings and death were investigated. The in-hospital mortality rate (IMR) was calculated and compared with the literature. The study was approved by the HUUFPI's CEP under opinion no. 3.058.406. **Results:** The 44 cases of HDB had a balanced distribution between men and women, a mean age of 57 years, colitis and diverticulosis were the main findings on videocolonoscopy. On upper digestive endoscopy, the main findings were varices and gastritis/esophagitis. Chronic conditions were common in the series studied. The IMR was 16.2%, higher than in the literature. **Conclusion:** The prevalent profile of people with HDB was that they came from the countryside and received elective care. The IMR for HDB at HUUFPI was higher than that described in the literature. Prospective studies with a larger cohort are needed to confirm these associations and identify independent risk factors for the findings identified and the outcomes analyzed.
Keywords: Colonoscopy; Gastrointestinal bleeding; Health services research.

INTRODUCTION

Lower gastrointestinal bleeding (LGE) continues to be a challenge in clinical practice. Its investigation requires a well-directed anamnesis, clinical examination and a collection of the patient's previous pathological history, especially regarding gastrointestinal pathologies, surgical procedures and risk factors for bleeding in the gastrointestinal tract [1].

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The estimated incidence of HDB is 20 to 27 cases per 100,000 adults, corresponding to 25% to 33% of patients hospitalized for digestive hemorrhage. This incidence increases with age and can be precipitated by underlying diseases and medications such as anti--inflammatories and anticoagulants [2,3].

With the advent of new technologies, such as capsule endoscopy and enteroscopy, it is no longer defined as bleeding distal to the Treitz angle, but as bleeding from the colon, rectum or anal canal, manifesting as hematohea or melena. It can present as an acute event, starting within the last three days, or as chronic bleeding, which can manifest as iron deficiency anemia, occult blood in the stool or intermittent scarce hematozia [2,4].

Although 80% of cases evolve with spontaneous resolution of bleeding, patients with comorbidities and more serious etiologies can die from complications related to hemorrhage [2,5]. The in-hospital mortality rate during hospitalization for HDB ranges from 2.4% to 3.9% [6]. This mortality is associated with high healthcare costs, prolongs hospitalization and places a heavy burden on the healthcare sector [4].

The most efficient and widely used diagnostic and therapeutic tool is colonoscopy, which requires a professional with the skills to diagnose and treat endoscopically, as poor patient management often leads to fatal outcomes [7]. It can be used to identify the bleeding site and perform hemostasis, as its diagnostic efficiency ranges from 48% to 90% [8], and it is the method of choice for hemodynamically stable patients with HDB [9].

Its advantages over other methods include precisely locating the bleeding, regardless of the etiology or intensity of the bleeding, the ability to collect samples for anatomopathological examination and the potential for therapeutic intervention [10].

Its disadvantages, however, include the need for bowel preparation, poor visualization in a poorly prepared colon and the risks of sedation in a patient with acute bleeding. Complications are reported in less than 2% of colonoscopies performed for HDB [11].

Colonoscopy may not be necessary in patients with previous presumptive or definitive diverticular bleeding who have modest blood loss that ceases spontaneously and who have had a high-quality colonoscopy in the last 12 months with adequate bowel preparation and no colorectal neoplasia [9].

If colonoscopy is carried out as an emergency, hemodynamic support must be provided and the patient must be stabilized for the examination, which includes raising serum hemoglobin through blood transfusions. After hemodynamic stabilization, colonoscopy should be performed within the first 24 hours, requiring intestinal preparation for better visualization, diagnosis and treatment [5].

As this is a public health problem that burdens the health sector, it is up to local health managers to study the epidemiological profile of their clients, so that there can be evidence-based health intervention. This evidence must take into account the health service's human and technological resources, as well as the administrative dynamics of the health care network in which the service is located [12,13].

These specificities of the population served include proximal determinants (age, gender and comorbidities) and middle and distal determinants such as support networks, access to health literacy as well as essential medicines, diagnostic and therapeutic support services (SADT) and a resolutive bed regulation system [12,13]

The University Hospital of the Federal University of Piauí (HUUFPI) is the most complex public health service in the state of Piauí. It has an endoscopy service with a medical residency, receives patients from all the mu-

nicipalities of Piauí, treats cases of digestive hemorrhage and does not have an urgent and emergency service.

In this sense, it is necessary to know the profile of patients treated for HDB at HUU-FPI, since situational diagnoses can guide local managers in developing action plans capable of reducing hospitalization costs and reducing morbidity and mortality from HDB in the state of Piauí. Thus, the aim of this study is to assess the epidemiological profile of cases of lower gastrointestinal bleeding and to analyze clinical variables related to the investigation, treatment and outcome of this condition.

METHODS

An analytical cross-sectional study was carried out on a series of cases of HDB with evidence of visible bleeding in the form of hematochezia, bloody diarrhea or melena and which came from the HUUFPI ward. The unit of observation was the reports from the diagnostic and therapeutic support service (SADT) and the electronic medical record, which included information on sociodemographic data, health conditions, discharge summary, tests carried out in the endoscopy and laboratory medicine sectors. The search for reports took place through the electronic medical record systems of management applications for university hospitals (AGHU) and the hospital information system (SISAH) for exams carried out between 01/01/2016 and 18/06/2017. Data was collected from December 2018 to January 2019.

The variables analyzed were gender, age, origin, type of care (emergency or elective), hemoglobin before and after colonoscopy as a means of assessing hemodynamic stability and the efficiency of endoscopic treatment to control bleeding, upper digestive endoscopy (UDE) findings and colonoscopy findings. The statistical method included count (n), mean ± standard deviation (SD), absolute proportion (%), normal distribution by the Anderson-Hynes (AD) test in which a two-tailed p-value > 0.05 signaled normal distribution. The paired Student's t-test was used to compare means.

In addition, Fischer's exact test or chi-square tests (χ^2) for adherence (or adjustment) and association (or independence) were used. The χ^2 tests of adherence were presented as single entry tables with n>25. When there were only two categories ($k=2$) with expected values (e-value or e-values) of at least 5, the *Yates* correction was used, but if e-values < 5, the p-value was obtained using the binomial distribution. When $k>2$ and α=5%, e-values should be ≥1 if they are all the same. If $k>2$ and e-values were different, the χ^2 test of adherence was applied when the following three requirements were met: n≥10, $n^2/k \geq 10$ and n/k ≥2 for tests with α=5% [14].

The χ^2 test of association was applied using contingency tables (double entry, n > 25). When the tables were 2x2, no e-value could be <5, and the *Yates* correction was not used because it is no longer recommended, and the correction proposed by Campbell and Richardson [15,16] was used instead. When the e-value was <5, Fisher's exact test was used [(14).]

The in-hospital mortality rate (IMR) was calculated as the number of deaths by the total number of HDB colonoscopy reports and then the test for a proportion was carried out using the general z-test using the formula $z = (p - p_{(exp)}))/se(p)$, where p was the calculated proportion, p_{exp} was the IMR during hospitalization for HDB in the literature [6] of 3.9% in the worst case scenario and se(p) was the standard error of the calculated proportion [(14)].

Odds *ratios* (OR) were calculated with a 95% confidence interval (95%CI) between the explanatory variable (gender, age group, origin and type of care) and the most frequent findings at colonoscopy, the hemoglobin value before and after colonoscopy and the

occurrence of deaths. The logistic regression modeling conditions were met [17]. A two-tailed p-value of less than 0.05 was considered statistically significant. MedCalc v. 21 *software* was used.

This study was approved by HUUFPI's Research Ethics Committee (CEP) under opinion number 3.058.406 and Certificate of Submission for Ethical Appraisal (CAAE) 95412217.5.0000.8050, in accordance with National Health Council resolution 466/2012. The patients were not contacted.

RESULTS

We identified 44 colonoscopy reports for HDB, 22 from men and 22 from women, with a mean age of 57.32 ± 17.75 years (minimum: 22; maximum: 81; AD: 0.57, p-value: 0.131). Men's ages ranged from 22 to 81 and women's ages ranged from 28 to 87. Hemoglobin before the test was 9.78±1.64 mg/dL (AD: 0.391, p-value: 0.366). Hemoglobin after the test was 9.90± 2.36 mg/dL (AD: 0.609, p-value: 0.104).

Variable	n	%	χ^2 of adhesion	p-value
Sex				
Man	22	50	0	1
Woman	22	50		
Age				
≤ 57.32 years	23	52	0,1	0,76
> 57.32 years	21	48		
Origin*				
Inside	28	68,3	5,5	0,0191
Capital	13	31,7		
Character*				
Urgency	8	19,1	16,1	0,0001
Elective	34	80,9		
Total	44	100		

Table1. Characteristics of patients undergoing colonoscopy for digestive bleeding. Teresina, Piauí, Brazil, 2019.

Note: * there is missing data.

Source: HUUFPI, 2017.

In cases where upper gastrointestinal bleeding was suspected as the cause of HDB, EDA was performed (n=27). In 33.3% of cases, there were no alterations on EGD (p-value: 0.0081). The EDA alterations most associated with HDB were esophageal varices and gastritis/esophagitis. The colonoscopy findings most associated with HDB were colitis in 35% of cases and this was statistically significant with a p-value of <0.0001 (Table 2).

Found	n	%	χ^2 of adhesion	p-value
Upper Digestive Endoscopy			20,66	0,0081
Normal	9	33,3		
Esophageal varices	5	18,5		
Gastritis/esophagitis	5	14,8		
Moniliasis	2	7,4		
Ulcer scar	2	7,4		
Antrectomy	1	3,7		
Cholangiocarcinoma	1	3,7		
Hypertensive gastropathy	1	3,7		
Gastric polyp	1	3,7		
Colonoscopy			34,136	<0,0001
Colitis	15	35		
Diverticulosis	9	21		
Normal	6	14		
Angiectasia	4	9		
Polyp	3	7		
Colorectal cancer	3	7		
Hemorrhoidal disease	2	5		
Rectal prolapse	1	2		
Stercoral ulcer	1	2		

Table2. Upper digestive endoscopy and colonoscopy findings from January 2016 to July 2017. Teresina, Piauí, Brazil, 2019.

Note: n = count; % = absolute proportion.

Source: HUUFPI, 2017.

The comorbidities of the patients in this series were seven cases of inflammatory bowel disease (five cases of ulcerative colitis; one Crohn's disease and one not defined), five cases of liver cirrhosis, two cases of ischemic or valvular heart disease, one case of liver failu-

re, one case of hepatitis C, one case of sickle cell anemia, one case of cervical cancer under chemotherapy and radiotherapy, one case of multiple organ failure under vasoactive drugs in the Intensive Care Unit, one case of infectious diarrhea, one case of cholangiocarcinoma and one case of human immunodeficiency virus (HIV) infection.

The IMR among HDB cases in the series was 16.2% (95%CI: 6.18%-31.9%, z-value = 3.86 and p-value = 0.0001). The six deaths recorded were people with inflammatory bowel disease, multiple organ failure, heart disease, cholangiocarcinoma and HIV infection.

There was no statistically significant difference between the hemoglobin levels before and after the procedure, despite an increase in the mean hemoglobin value (before: 9.78 mg/dL and after: 9.90 mg/dL, t: -1.28, p-value: 0.208). There was no association between the findings of diverticulosis, colitis, hemoglobin levels and death with the health determinants analyzed; however, it is possible that having an elective procedure has a lower chance of death (Table 3).

DISCUSSION

Although the literature shows a predominance of HDB in males and in older people [18], in this series, there was no difference between the sexes or between the age groups with a cut-off point above the mean. Colonoscopy at HUUFPI for HDB was associated with the type of care and the origin of the patient, with the strongest association with the first condition.

The predominance of people from the countryside and the elective nature could be justified by the local health care network, as HUUFPI has no urgent and emergency point of entry and patients seen there are referred by municipal and state managers through the bed regulation system.

There was no statistically significant difference between hemoglobin values before and after colonoscopy. Despite this, colonoscopic treatment plays an important role in controlling bleeding and the time to perform colonoscopy is after the bleeding has stopped, which in the vast majority of cases occurs spontaneously [2,3,11,19].

It was observed that in around 70% of the EGD exams, there were alterations that caused or contributed to the lower gastrointestinal bleeding. This reinforces the need for this test to be carried out as part of the complementary propaedeutics for investigating the etiology of lower gastrointestinal bleeding [20]. This finding is important for changing the hospital's internal protocol so that EDA is performed in all cases of CDH.

The causes of HDB can be grouped into various categories such as anatomical (diverticulosis), vascular (angiodysplasia or radiation-induced ischemia), inflammatory (inflammatory bowel disease or infectious) and neoplastic [21]. In a review that included 1,559 patients with acute hematochezia, colitis was the main cause, followed by diverticulosis [21]. However, in most series, diverticulosis is the most common non-group cause of HDB, accounting for approximately 15 to 55% of cases [22].

Angiodysplasia as a cause of HDB is controversial, as some references state that it is the most frequent cause of HDB in patients over 65, while others state that angiodysplasia may be an infrequent cause of HDB [21]. Hemorrhoidal disease, on the other hand, is the most common cause of rectal bleeding in patients under the age of 50 [23]. However, hemorrhoidal bleeding is usually minor. In general, anatomical and vascular causes of bleeding are painless, large-volume blood loss, while inflammatory sources are associated with diarrhea and abdominal pain [21].

Finding or Outcome	Explanatory variable	n	*Odds-ratio* (95%CI)	p-value
Colitis versus other findings	Sex[3]	44	1,48 (0,43-5,10)	0,53
	Age group[4]	44	1,92 (0,54-6,74)	0,30
	Origin[5]	41	1,31 (0,33-5,19)	0,69
	Character of service[6]	42	1,03 (0,21-5,05)	0,96
Diverticulosis versus other findings	Sex[3]	44	1,68 (0,40-7,07)	0,47
	Age group[4]	44	1,92 (0,54-6,74)	0,30
	Origin[5]	41	3,75 (0,80-17,47)	0,09
	Character of service[6]	42	5,45 (0,28-104,7)	0,26
Hemoglobin before[1]	Sex[3]	42	0,68 (0,20-2,30)	0,53
	Age group[4]	42	1,01 (0,30-3,43)	0,97
	Origin[5]	41	0,54 (0,14-2,07)	0,37
	Character of service[6]	41	3,6 (0,63-20,52)	0,14
Hemoglobin after[2]	Sex[3]	38	0,52 (0,14-1,91)	0,32
	Age group[4]	38	0,69 (0,18-2,53)	0,57
	Origin[5]	37	1,27 (0,32-5,05)	0,73
	Character of service[6]	37	6 (0,64-56,06)	0,11
Death	Sex[3]	43	0,17 (0,01-1,60)	0,12
	Age group[4]	43	0,38 (0,06-2,34)	0,29
	Origin[5]	41	0,15 (0,008-3,08)	0,22
	Character of service[(6]	42	0,16 (0,02-1,03)	0,05

Table 3. Measures of association between health determinants and findings or outcomes in a series of patients with lower gastrointestinal bleeding. Teresina, Piauí, Brazil, 2019.

Note: [(1)]>9.78 mg/dL *versus* ≤9.78 mg/dL; [(2)]>9.90 mg/dL *versus* ≤9.90 mg/dL; [3]male *versus* female; [(4)≤57].72 *versus* >57.72 years of age; [5]capital *versus* interior; [6]elective *versus* emergency.

Source: HUUFPI (2019).

The six deaths recorded were people with inflammatory bowel disease, multiple organ failure, heart disease, cholangiocarcinoma and HIV infection. This patient profile may be the reason why the in-hospital mortality rate at HUUFPI was higher than in the literature[6]

HDB tends to be self-limiting, so that in 80-85% of cases it ceases spontaneously, has a hospital morbidity rate of 17% and a mortality rate of around 3% [24]. Mortality in HDB in other series is associated with severe comorbidities and hemodynamic instability [8,9,21], which may justify the possible association of mortality with emergency examinations in this series.

The size of the series was a limiting factor and missing data may have affected the measurements. Despite this, the statistical tests made it possible to make efficient inferences for the population studied over the period considered. Hemoglobin stability as an isolated data point is not pathognomonic of bleeding control. The design used does not take into account temporal variations in clinical variables. The unit of analysis being reports may have excluded people who died without having been tested.

Errors in medical records or technical difficulties in obtaining information from the electronic medical records system may have omitted information on comorbidities, medications in use and other risk factors.

CONCLUSION

During the period analyzed, patients with HDB at HUUFPI were mainly from the interior of the state and were treated on an elective basis. The patients' hemoglobin remained stable when comparing the values before and after the procedure. More than half of the patients underwent EDA. The main findings of this test were normal reports or gastritis/esophagitis, while videocolonoscopy revealed colitis and diverticulosis.

The IMR for HDB was higher than described in the literature and this can be explained by the comorbidities. No independent risk factors were identified among the explanatory variables to determine the outcomes 'hemoglobin levels' before and after videocolonoscopy and death. It is possible that being an elective procedure is a protective factor.

More studies are needed with a prospective design and detailed identification of the determinants and conditioning factors for the outcomes related to lower gastrointestinal bleeding at HUUFPI.

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